regards as important enough to warrant the reference of the latter to a different stratum of the personality, a different *ego*. The reason of this is, that in the case of the voluntary movements we have a mental representation of the act about to be done, and we unite its elements into a single idea. As this becomes difficult by reason of the disparity of the various acts, the evidences of mental conflict become prominent. On the other hand, in the automatic acts no mental representation is present to the mind, and therefore no conflict arises. In brief, we can do two things at a time with advantage in two quite different ways. The first is when they contribute to the same end, such as the different movements of the two hands of the pianist or the violinist, and so on; the second, when the one is done automatically and unconsciously; and both of these capabilities will vary very considerably in different persons.

M. Binet has reduced to experiment a further class of automatic reproductions. We all appreciate the tendency to beat time when listening to a lively musical production, or the unconscious adaptation of our gait to the selection of a band on the street. The same fact is shown in the case of an hysterical subject in whose hands is placed a recording dynamometer while a metronome is beating in the room. The result is an unconscious series of pressures to the time of the metronome beats.

THOUGHT AND RESPIRATION. — The experiments of Professor Leumann indicating the adaptation of the rate of reading, and possibly of other mental work, to such physiological rhythms as the respiration (v. *Science*, Nov. 22, 1889), have called forth some interesting comments upon his thesis. Attention has been directed to the analogy between this and the methods adopted by the Yogi to reach the condition of abstract contemplation and rapt ecstasy. Professor Max Müller contributes some extracts from the Sanscrit *Yoga-sûtras* describing this *prânâyâma*, or expulsion and retention of the breath for the purpose of steadying the mind. The Yogi must assume a firm and easy position, and then begin to regulate his breath. He draws it in through one nostril, pressing his finger on the other, and then, after retaining it some time, emits it through the other nostril. "All the functions of the organs being preceded by that of the breath,—there being always a correlation between breath and mind in their respective functions, — the breath, when overcome by stopping all the functions of the organs, effects the concentration of the thinking principle to one object." The time devoted to each of the three factors is regulated by so many repetitions of the syllable *om* or other mystic formula, or by turning the left hand round the left knee a given number of times. The time devoted to inspiration is the shortest, and that to the retention of the breath the longest. The operation is performed as a preparation for an abnormal mental state in which incredible powers are exemplified. The theory of the process is thus given in a commentary. "By the motion of the breath the thinking principle moves; when that motion is stopped, it becomes motionless, and the Yogi become firm as the trunk of a tree: therefore the wind should be stopped. As long as the breath remains in the body, so long it is called living. Death is the exit of that breath: therefore it should be stopped." Another writer, Mr. Ley, notices the use of deep and rapid respiration as an anæsthetic. Some dentists ask their patients to breathe quickly and fully some four or six minutes, at the end of which the patient becomes giddy, to some extent loses consciousness, and a short operation may be painlessly performed. While in this condition, the patient has no power to move his arms, but will open his mouth at the bidding of the dentist (v. *Nature*, Feb. 6, 1890).

HEALTH MATTERS.

THE ORIGIN OF FEVER.—M. Roussy, in a paper read before the French Academy of Medicine by M. Schutzemberger, states that fever is often the result of soluble non-organic principles, but of microbian origin, being introduced into the animal economy. He has ascertained, according to the *British Medical Journal*, that injecting into the blood or under the skin water in which different organic matter has been macerated also determines a febrile condition. M. Roussy has isolated the pyrexogenic element, and concludes from the results of his experiments that certain diastasis or zymosis (soluble ferments) have a febrile influence: the water in which the yeast of beer has been macerated is an instance. M. Roussy used the same method as M. Berthelot for obtaining "invertine," and it is possible that the body discovered by M. Roussy is identical with the invertine.

EUROPEAN INFANTILE MORTALITY.—We learn from the *Medical Record* that a comparative study of infant mortality in different European countries has been made by Dr. Fodar, with the following results: of 1,000 children born alive, 106.3 die during the first year in Norway, 137.1 in Sweden, 154 in England, 169.1 in France, 217.7 in Prussia, 220.1 in Italy, 254 in Hungary, 258.2 in Austria, 317.1 in Bavaria, and 329.5 in Wurtemburg. With regard to Bavaria, there is considerable difference in the infant death-rate in different districts. Thus in Suabia it reaches the enormous figure of 409 (nearly four times as great as that of Norway), and in Upper Bavaria it is 406, while in the Bavarian palatinate it is only 187. From these statistics it would appear that the hygiene of infancy is better understood in Norway than elsewhere, and that German nurslings are either particularly delicate or particularly unfortunate in the mode of their bringing up.

THE FATE OF CADAVERIC MICROBES.—It is a comfort to learn, on the authority of M. Esmarch, that most pathogenic microbes succumb sooner or later after their victims have died. Experiments were carried out with nine different micro-organisms, says the *Medical Press*, and the bodies of the animals on which they had wreaked their wicked will were either buried or kept under water, or exposed to the air. The bacillus of septicæmia survived ninety days, while that of anthrax disappeared within a week. The bacillus of fowl cholera was seldom found after three weeks, but the tubercular microbe did not lose its virulence until 204 and 252 days had elapsed. All trace of the other organisms was lost in from three days to a week, including those of typhoid-fever, Asiatic cholera, and tetanus. As a general rule, the more active the decomposition, the sooner did they perish, and this is another argument in favor of "earth-to-earth" burial, pending the universal adoption of cremation.

RECENT SAVING OF LIFE IN MICHIGAN. — In a carefully prepared paper read before the Sanitary Convention at Vicksburg, the proceedings of which are just published, Dr. Baker gave official statistics and evidence which he summarized as follows: "The record of the great saving of human life and health in Michigan in recent years is one to which, it seems to me, the State and local boards of health in Michigan can justly 'point with pride.' It is a record of the saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet-fever, and nearly six hundred lives per year saved from death by diphtheria, — an aggregate of eleven hundred lives per year, or three lives per day, saved from these three diseases. This is a record which we ask to have examined, and which we are willing to have compared with that of the man who 'made two blades of grass grow where only one grew before.'"

GASTRIC JUICE AS A GERMICIDE.—Drs. Straus and Wurtz have conducted a series of experiments in order to ascertain the action of the gastric juice on the bacilli of tubercle, charbon, typhoid, and cholera-morbus. The gastric juice from man, dogs, and sheep was selected for the experiments. It was found, as stated in the *British Medical Journal*, that digestion for a few hours at a temperature of 100° F. destroyed all the germs. The bacillus anthracis was killed in half an hour, the bacillus of typhoid and cholera in under three hours, while the bacillus of tubercle bore digestion for six hours, under which time it was still capable of provoking general tubercular infection. Even when digested for from eight to twelve hours, the

bacillus was still capable of producing a local tubercular abscess, not followed by general infection. Over twelve hours' digestion destroyed it completely. The germicide influence of gastric juice appears to be due to its acid contents, as it was found that hydrochloric acid alone, dissolved in water in the same proportion as it is in gastric juice, proved as active a destroyer of the bacilli. The pepsin appears to have no influence on the germs. Drs. Straus and Wurtz, who publish their researches in *Archives de Médecine Expérimentale*, wisely remind their readers that the germs, when protected by animal and vegetable tissues and introduced into the stomach in ordinary nutrition, are not exposed to so direct and prolonged action of the acid constituents of gastric juice as in these experiments.

BOOK-REVIEWS.

Electric Light Installations and the Management of Accumulators. By Sir DAVID SALOMONS. New York, Van Nostrand. 12°. $1.50.

As this is the fifth edition of a work which first appeared only two or three years ago, it is unnecessary to say that it fills a very important place in the literature of electrical science. It is not intended as a text-book on electric lighting, nor is it addressed to electricians as such; but it covers a field of its own, which had been previously neglected, or, rather, a field which had not been as alluring to writers on the subject as had other departments of the science.

Though the author disclaims any pretence to literary style, his work proves that he possesses in a high degree the three essential requisites of a successful writer; namely, to have something interesting to say, to be able to say it so that it may not be misunderstood, and to stop when he has said it. As a result, he has given us a plain statement of facts in regard to the practical side of electric lighting and the management of accumulators, attractively and clearly presented, and in as concise a manner as is consistent with the nature of the subject. The author proceeds on the assumption that the reader has a general knowledge of electric lighting, omitting minor details, which may best be found in any elementary book on the applications of electricity.

To those familiar with the work in its previous editions, it may be well to mention that this edition has been carefully revised and greatly enlarged, besides which many new engravings have been introduced, rendering the text more intelligible and at the same time showing the various types of electrical apparatus adopted by different manufacturers. To those who have never read the book, its scope may best be gathered from the author's statement that previous to its appearance no book had been written on the special subject of the management of the accumulator. Of the two classes of persons most directly interested in the secondary battery, manufacturers and purchasers, the former, as a rule, know comparatively little of its properties, their knowledge being confined mainly to laboratory tests. The true knowledge of how a battery will act is gained only by long experience. While it is in the hands of a non-professional user, rarely competent to examine the question for himself, this knowledge cannot be gained or turned to account. There are but few who have both the opportunity and the qualifications necessary to observe, scientifically as well as practically, the working of an accumulator, and fewer still with time, opportunity, and inclination to write upon the subject. To fill this gap, between the manufacturer and the general user, the author has attempted; and the demand for the present work proves that his attempt has met with a full measure of success.

The book is divided into two parts, the first treating of cells and their mode of employment; the accumulator house; charging and discharging; and failures, with their causes and remedies. The second part is devoted to installation work and practice, treating of engines, dynamos, and motors; switch-boards, switches, instruments, lamps, and wiring; rules for the prevention of fire risks; action of cells with dynamo; methods of working and governing; alternating currents, testing, and estimating, etc.; ending with a description and history of the author's own private installation of secondary batteries at Broomhill. The book is fully illustrated, and provided with a very complete index.

A Text-Book on Roofs and Bridges. Part II. Graphic Statics. By MANSFIELD MERRIMAN and HENRY S. JACOBY. New York, Wiley. 8°. $2.50.

THIS volume, as its name indicates, is a treatise on graphic statics as applied to the discussion of common roofs and bridges. It is an outgrowth of the course of instruction in the subjects named, given to the students of civil engineering in Lehigh University, in which institution the authors are respectively professor of and instructor in that branch of applied science. The course in civil engineering in the university mentioned consists of four parts; namely, the computation of stresses in roof-trusses and in all the common styles of simple bridge-trusses; the analysis of stresses by graphic methods; the design of a bridge, including the proportioning of details and the preparation of working drawings; and the discussion of cantilever, suspension, continuous, and arched bridges. In this volume the second part of this course is presented, together with much additional matter.

Being offered as an elementary text-book, we need not look for many novelties in the work aside from the method of arrangement and presentation, though we may call attention to the abbreviated processes employed in some of the diagrams for wind-stresses, to the determination of stresses due to initial tension, and to portions of the analysis of maximum moments and shearing strains under locomotive wheel loads, as possessing some points of novelty as well as of practical value.

For the convenience of students, blank leaves are provided, alternating with the printed pages, upon which to record the numerical computations necessary in the preparation of graphical analyses, and upon which to make sketches of the stress diagrams required in the problems. The book is divided into three main parts, treating respectively of general principles and methods, of roof-trusses, and of bridge-trusses. An appendix contains the answers to the problems. The work is written in a clear and attractive style, and, though intended mainly as a text-book for students, it is not without value to engineers and others.

Elements of Logic as a Science of Propositions. By E. E. CONSTANCE JONES. Edinburgh, T. & T. Clark. 8°. $3.

THIS book is a very ambitious, but, as it seems to us, very unsuccessful, attempt to reconstruct the science of logic. The author takes the ground that logic is an objective science, and not a branch of psychology, and then goes on to define it as "the science of the import and relations of propositions," denying altogether that it is a science of reasoning or of the laws of thought. The chief characteristic of the treatise, however, is not the view taken of the science, nor any new or startling theory of its fundamental principles, but the employment of an immense number of new-fangled terms in place of the familiar ones that have been in use for centuries. What the object of such an innovation may be, unless to give the work an air of originality, we do not know; for we fail to see in what respect the new nomenclature is an improvement on the old. Thus, we cannot see the propriety of calling existence "quantitiveness," nor of using the phrase "subject of attributes" instead of the familiar term "substance." Essential attributes are termed by the author "intrinsic," and accidental ones "extrinsic;" an absolute attribute is called "independent," and a relative one "dependent;" hypothetical propositions are "inferential," and disjunctive ones "alternative;" and so on throughout the book, till the reader who looked at the terminology only might almost fancy that he was studying a new science. Yet, apart from this strange terminology, we fail to find in the work any thing specially new or noteworthy, while in some passages there is evidence of much confusion of thought. This is specially apparent in